

IN THE CLAIMS:

The text of all pending claims, (including withdrawn claims) is set forth below. Cancelled and not entered claims are indicated with claim number and status only. The claims as listed below show added text with underlining and deleted text with ~~strikethrough~~. The status of each claim is indicated with one of (original), (currently amended), (cancelled), (withdrawn), (new), (previously presented), or (not entered).

Please AMEND claims in accordance with the following:

1. (currently amended) A computer-based system in communication with a plurality of different types of computing sources of functionality, each computing source of functionality being a service to a user, comprising:

means for associating each service with a semantic service description (SSD), which semantically describes the plurality of different types of computing sources of functionality for filtering, composing and executing the service, and is discoverable as an available service according to one or more discovery protocols, wherein the SSD comprises:

a semantic description of the service, including a semantic description of input/output parameters of the service as semantic input/output parameters, based upon an ontology,

a filter parameter specifying relevance of the service, and

a grounding including:

a service invocation interface to the service; and/or

an input/output parameter mapping and/or an input/output parameter transformation function between the semantic input/output parameters and syntactic input/output interface parameters of the service;

means for dynamically discovering one or more of the SSDs as the available services through the plurality of discovery protocols to discover the SSDs;

means for real-time composing by a user an executable task comprising combining two or more of the available services by dynamically presenting to the user feasible possible executable tasks based upon one or more of filtering the discovered available services according to a context of the user including the composed task, the filter parameters in the SSDs, and/or the semantic input/output parameters in the SSDs; and

means for a computer system executing a task computing, thus enabling users to define

~~tasks by combining available functionality and to execute such tasks by invoking the two or more available services that comprise the task, including enabling the user to interact with an invoked available service, based upon the grounding in the associated SSDs including the service invocation interfaces and the input/output mapping and/or transformation functions between the semantic input/output parameters and the syntactic input/output parameters.~~

2. (currently amended) The computer-based system of claim 1, wherein ~~available~~the computing sources of functionality originate in devices, computing applications, and electronic services and/or previously defined tasks~~available through remote procedure calls including Web Services, UPnP, CORBA, RMI, RPC, DCE, DCOM or comprises previously defined tasks.~~

3. (currently amended) The computer-based system of ~~claim 2~~claim 1, wherein ~~all available functionality is abstracted to the user as a service and each service~~the SSD is expressed in a service description language.

4. (currently amended) The computer-based system of ~~claim 3~~claim 1, wherein ~~each service has at least one semantic description associated with it, each semantic description can be~~SSD is provided by any combination of ~~the~~a creator or owner of the service, ~~the owner of the service~~computing source of functionality or some other third party and ~~the system further comprises means for making~~service can be made available or unavailable a service by making available or unavailable discovery of one or more of its semantic descriptionsSSDs associated with the service.

5. (cancelled)

6. (currently amended) The computer-based system of ~~claim 5~~wherein the specifiedclaim 1 further comprising means for saving composed tasks ~~are saved, automatically, or as instructed by the user, as new available services.~~

7. (original) The computer-based system of claim 6, wherein the previously specified tasks saved as services are available to the user who created them, to all other users,

or to any user-defined, or pre-defined group of users.

8. (currently amended) The computer-based system of ~~claim 7~~claim 1, wherein ~~the means for discovering services utilize a service discovery protocol, including any the one or more discovery protocols include~~ one or any combination of the following: UPnP, UDDI, Local Service Repository, Jini, Bluetooth SDP, Rendezvous, and InfraRed (IR).

9. (currently amended) The computer-based system of ~~claim 8~~claim 1, wherein the ~~means for filtering of the discovered available services according to the context of the user~~ include any one or any combination of the following:

User profile, Task at hand, User device characteristics, User location, User motion status, User network connectivity, User specified keywords, features of a set of the available services when considered as a whole, individual available service features.

10. (currently amended) The computer-based system of ~~claim 9~~claim 1, wherein the ~~means for specifying a task include~~real-time composing by the user of the executable task includes any one or any combination of the following:

a planning-based, automated system, or
an interactive user interface that supports any one or any combination of the following elements: visual, voice, text, Braille, ~~tactile~~tactile.

11. (currently amended) The computer-based system of ~~claim 10~~claim 1, wherein the ~~means for executing a specified task utilizes a service execution mechanism including any one or any combination of the following:~~SSD service invocation interface is according to one or more of a remote procedure call including Web Services calls, SOAP, UPnP actions, JINI, CORBA, RMI, RPC, DCE, DCOM, KQML, FIPA-ACL, or InfraRed (IR), or local~~Local~~ function call, and Local call, or local object call, or code described directly in the SSD.

12. (currently amended) The computer-based system of ~~claim 11~~claim 1, wherein the ~~means for creating, removing, and further comprising means for managing services include~~a computing source of functionality as an available service through the associated SSD by any one or any combination of the following: Graphical a graphical user interface controlling creation, provision, holding, and/or removal of the associated SSD, executing or interacting with the

computing source of functionality, or processing events from an operating system of a user-operated device, service execution, device interaction, events from the operating system of the user-operated device and applications executing on the user-operated device.

13. (currently amended) The computer-based system of ~~claim 12~~claim 1, further comprising: ~~wherein the means includes:~~

a module for discovering services to publish the SSD as the available service by making the SSD discoverable through one of the plurality of discovery protocols;

a module for filtering services to discover the SSDs as the available services as a Service Discoverer;

a module to filter the SSDs as filtered available services as a Service Filter;

a module for to automatically specifying tasks according to user's goals or for assisting specify a task of two or more available services or to assist the user in specifying tasks by providing the user with information about how the task of two or more available services comprising the tasks can be combined to comprise the task, as a Task Specifier;

a module for assisting to assist the user with executing tasks, the task by invoking the available services that the comprise the task is composed of and providing the user with means for interacting with the invoked services as they are executed, including enabling the user to interact with an invoked service as the available services are executed, as a Task Executer, and

a User Interface that assists the user with to the Service Discovery Discoverer, the Service Filtering Filter, Service Composition, Service Execution and the saving of defined tasks for future use the Task Specifier, and the Task Executer.

14. (currently amended) The computer-based system of claim 13, further comprising a single computing device or a distributed networked computer system, wherein the modules execute on at the single computing device, or wherein the modules, or subcomponents of the modules, are execute as distributed across multiple networked computing devices in the distributed networked computer system, and the modules are accessible by programmatic interfaces that are accessible to the User Interface that is preferably running on the invoked at a relevant computing device operated by the user.

15. (currently amended) The computer-based system of claim ~~12~~13, wherein the user engages in User Interface enables an executable workflow composition of the task

according to a sequence of invoking the Service Discovery, followed by the Service FilteringFilter, followed by the Task SpecificationSpecifier, followed by the Task ExecutionExecuter, or any combinations thereof.

16-18. (cancelled)

19. (currently amended) The computer-based system of claim ~~14~~15, wherein the User Interface is ~~a graphical one~~ and comprises any combination of:

a Discovery Pane for displaying selectable discovered and filtered services ~~and filtered services~~;

a Details Pane for displaying additional information of a selected service from the Discovery Pane;

a Composition Pane for displaying listings of ~~matched~~compatible services, according to the filtering, from the Discovery Pane;

a Construction Pane for interactively specifying ~~constructing~~ a workflow composition of selected compatible services as the task;

an Information Pane for displaying general status information ~~about the processes of the tool, including information about the progress of the execution~~;

a Save Pane for saving a composition of services;

wherein the User Interface displays all or a subset of the panes ~~are~~ simultaneously displayable to the user, and

wherein the User Interface real-time updates information in each pane according to a result of an action in another pane ~~actions on each of the panes results in automatically updating the related information displayed in other panes.~~

20. (currently amended) The computer-based system of claim 19, wherein the ~~user can move~~ User Interface enables navigating to the Construction pane by either selecting a service from the Discovery ~~pane~~Pane and ~~choosing the~~ selecting a displayed construct function, or by selecting a pair of ~~matched~~compatible services and ~~choosing~~ selecting the displayed construct function.

21. (currently amended) The computer-based system of claim 19, wherein the ~~user can add or remove~~ User Interface enables adding and/or removing services from ~~the~~ a currently

composed task in the ~~Construct pane~~Construction Pane by choosing ~~the~~a plus or minus function for each possible workflow position that an insertion or deletion is possible, ~~as is automatically determined by the back-end system~~according to the discovering and the filtering.

22. (currently amended) The computer-based system of claim 19, wherein the ~~user can execute~~User Interface enables the user to execute a specified task by choosing ~~the~~an execution function when ~~that~~the task becomes executable, as automatically determined ~~by the underlying back-end system~~according to the executing, while either at the ~~Construct pane~~Construction Pane or the Composition pane.

23. (currently amended) The computer-based system of claim 19, wherein the ~~system~~executing further comprises ~~appends~~completing a composition of services as a task by appending any, pre-defined or user-defined, compatible composition of available services before or after a partially specified composition of services by the user, and ~~executes~~executing the complete composition ~~whenever the user chooses the execution function~~in response to a user input.

24. (currently amended) The computer-based system of claim 19, wherein a saved composition of services as the task is extendable with other available discovered and filtered services~~to be saved can be extended so that its constituent services satisfy requirements relating to their properties.~~

25. (currently amended) The computer-based system of claim ~~18~~13, wherein the User Interface is ~~a graphical one~~ and comprises selectable tab window panes including any combination of:

a Discovery Pane for displaying selectable discovered and filtered services~~and filtered services~~;

a Details Pane for displaying additional information of a selected service from the Discovery Pane;

a Composition Pane for Displaying listings of ~~matched~~compatible services, according to the filtering, from the Discovery Pane;

a Construction Pane for interactively specifying ~~constructing~~ a workflow composition of services as the task;

an Information Pane for displaying ~~general~~status information ~~about the processes of the tool, including information about the progress of the execution; and~~

a Save Pane for saving a composition of services, ~~in terms of criteria;~~

wherein the User Interface visibly displays at any given time only one of the window pane tabs ~~is visible~~ to the user, and

wherein the User Interface real-time updates information in each pane according to a result of an action in another pane ~~actions on each of the panes results in automatically updating the related information displayed in other panes.~~

26-30. (cancelled)

31. (currently amended) The computer-based system of claim ~~48~~15, wherein the User Interface is a graphical ~~one~~ and comprises a first window pane for displaying to display discovered services and filtered services, and a second window pane for displaying the to display a current task composition as composed by the user, and controls for ~~going back and forth in the to navigate a displayed history of the task composition, and a control for executing execute~~ the task composition whenever possible.

32. (currently amended) The computer-based system of claim 31, wherein the User Interface automatically places a selected service to ~~the a~~ proper place ~~of in~~ the workflow composition ~~sequence of the task.~~

33. (currently amended) The computer-based system of claim 32, wherein the User Interface ~~will automatically complete~~completes the task composition whenever possible, ~~including the case when the upon an available filtered services can only be combined in a single manner for a composition that can be executed~~compatible service.

34. (currently amended) The computer-based system of ~~either~~ claim ~~48~~15, wherein the User Interface is a web client.

35. (currently amended) The computer-based system of claim 34, wherein the web client comprise a browser to as the task is executed the user's browser might pop-up a new window or re-direct the browser to a new link that allows enabling the user to enter information

related to the Task Execution~~execution of the task~~ or enter feedback regarding the executed task.

36. (currently amended) The computer-based system of claim ~~48~~15, wherein the User Interface is a command line ~~Interface~~interface, wherein each time the user types text that ~~can be matched against~~compatible with a discovered and/or a filtered service~~service~~, upon the user pressing a pre-assigned key, ~~it~~the User Interface inserts in the workflow composition of the task the ~~matched~~compatible service or, if multiple ~~matches~~compatible services exist ~~it~~the User Interface provides a selectable listing thereof of them for the user to select by means of further typing text that matches one of the many services.

37. (currently amended) The computer-based system of claim 36, wherein ~~the a~~a displayed sequence of user selected service ~~comprise a sequence that~~services corresponds to ~~a~~the task, and ~~can subsequently be executed by means of pressing a pre-assigned key~~a single user input executes the task.

38. (currently amended) The computer-based system of claim ~~44~~13, wherein the Service Discovery, the Service Filter, the Task Specifier, the Task Executer, and the User Interface ~~module, Filtering Module, Composition Module and Execution module and User Interface~~ execute on the same computing device.

39. (currently amended) The computer-based system of claim ~~38~~13, wherein the ~~Composition Module~~Task Specifier comprises an Inference Engine that ~~can identify~~presenting to the user the feasible possible executable tasks by identifying all possible pair wise combinations of the available services that ~~can be successfully executed in a~~for an executable workflow composition of the task~~given semantic descriptions of the constituent services~~.

40. (currently amended) The computer-based system of claim 38, wherein the ~~Composition Module~~Task Specifier comprises an Inference Engine that ~~can identify~~presenting to the user the feasible possible executable tasks by identifying all possible compositions of the available services as possible executable tasksthat ~~can be successfully executed in their entirety given the semantic descriptions of the constituent services~~.

41. (currently amended) The computer-based system according to any one of claims 39 and 40, wherein the Inference Engine returns a number of the possible pair-wise matches or combinations of the available services or executable task compositions of services that are returned by the Inference engine might be restricted by according to criteria that include an upper bound on computational resources, an upper bound on computing time, ~~the~~ a number of the available services in a composition, or by a pre-determined total number of the possible pair-wise matches combination of services or task compositions to be computed computed.

42. (currently amended) The computer-based system of claim 41, wherein the Inference Engine includes ~~a composition logic wherein the composition logic is a rule, or a set of rules, or a set of logic statements,~~ as a task composition logic.

43. (currently amended) The computer-based system of claim ~~38~~ 13, further comprising one or more local and/or remote databases to store one or more SSDs, wherein the discovery module Service Discoverer uses a local semantic service description (SSD) databases SSD database or accesses a remote SSD databases and retrieves the SSDs of the found service from those databases, using the service's ID to retrieve a corresponding associated SSD of a source of functionality presenting a service, according to an identifier (ID) specific to the ~~a~~ discovery mechanism through which the service is found used to discover the source of functionality presenting the service.

44. (currently amended) The computer-based system of claim 43, wherein one of the plurality of the discovery mechanisms is UPnP and the ID is Unique Device Name (UDN) of UPnP.

45. (currently amended) The computer-based system of claim 38, wherein ~~mechanism known as~~ one of the discovery mechanisms is UPnP discovery ~~action is used to retrieve one or more pointers to the semantic description of the service.~~

46. (currently amended) The computer-based system of claim 14, wherein the User Interface ~~is running~~ executes on a computing device ~~that is different than the computing devices Discovery Module, Filtering Module, Composition Module and Execution module~~ execute executing the Service Discoverer, the Service Filter, the Service Specifier, or the Task Executer.

47. (currently amended) The computer-based system of claim 46, wherein the User Interface is a web client (browser) that communicates by HTTP with the ~~Discovery, Filtering, Composition and Execution Modules using http~~Service Discoverer, the Service Filter, the Task Specifier, or the Task Executer.

48. (currently amended) The computer-based system of claim 46, wherein the User Interface is an application that executes on ~~the end-user's~~a user computing device and communicates by an application programming interface with Service Discoverer, the Service Filter, the Task Specifier, or the Task Executer~~each of the Discovery, Filtering, Composition and Execution modules via the programmatic interface of these modules.~~

49. (currently amended) The computer-based system of claim 14, wherein the ~~end-user's~~single computing device is using any of a desktop, laptop, pen computer, PDA or a mobile phone.

50. (currently amended) The computer-based system of claim ~~14~~13, wherein a service may have one or more interfaces for the user to interact with the service prior and during ~~its execution.~~execution of the service.

51. (currently amended) The computer-based system of ~~claim 14~~claim 13, wherein a ~~service comprises~~the one or more SSDs as the available services comprise any one of:

“View on Display” ~~which lets the user~~ to view a user-specified document on a display and optionally control how ~~it is shown~~the document is displayed;

“View on Multiple Displays” ~~which lets the user~~ to view a user-specified document on more than one display and optionally control how ~~it is shown~~the document is displayed;

“Map Viewer” ~~which lets the user~~ to view a map of a user-specified location and optionally control how ~~it is shown~~the map is displayed;

“Map Router” ~~which lets the user~~ to view a map or textual description of ~~the~~a route from/to a user-specified location from/to a predefined or by a user-specified location optionally control how ~~it is shown~~the map or textual description is displayed;

“Instance Providing Service” ~~which provides, when executed, to provide~~ a semantic instance ~~where a semantic instance is an instance of a class described in an ontology~~;

~~“Print” which lets the user to print a user-specified document or a~~ semantic instance in a specific format on a printer in a pre-defined way or optionally control how it is printed ~~the document or the semantic instance is printed;~~

~~“Fax” which lets the user to send a fax of a user-specified document to a user-specified fax number and optionally control how it~~ the document ~~is faxed;~~

~~“Play Video” which lets the user to play a user-specified video content and optionally control how it~~ the video ~~is played;~~

~~“Play Audio” which lets the user to play the~~ a user-specified audio content and optionally control how it the audio ~~is played;~~

~~“Digital Photo Frame” which lets the user to show~~ display ~~a user-specified image content and optionally control how it is shown~~ the image is displayed;

~~“Location Determination” which~~ to automatically determines the determine a ~~location of a user-operated device;~~

~~“Directory Publisher” which lets the user to choose one instance out of a~~ set of instances of the same type;

~~“Telephone Dialer” which lets the user to dial a user-specified phone number;~~

~~“TC Storage” which lets the user to store or retrieve files;~~

~~“Copy to Removable Storage” which lets the user to store one or a set of files into predefined removable storage media and optionally control how they~~ the files ~~are saved;~~

~~“Emailer” which lets the user to send email to a user-specified email address optionally with attached user-specified documents and optionally control how it~~ the email ~~is sent;~~

~~“List chooser” which lets the user to choose an semantic instance from the~~ a ~~list of semantic instances of the same type;~~

~~“Property chooser” which lets the user to choose one of the properties from a semantic instance;~~

~~“Your input” which lets the user to input the values for the attributes of the~~ a ~~semantic object;~~

~~“Instance viewer” which lets the user to check and modify a semantic instance;~~

~~“Local Instance Selector” which lets the user to select one or more~~ local ~~semantic instances local to the computing device;~~

~~“Semantic Instance Copier” which lets the user to copy the~~ a ~~semantic instance into the local computing device;~~

~~“L-Note” which lets the user to read and leave notes pertinent to a location;~~

“Database publisher” ~~which publishes to~~ publish a whole of or a part of a table from a database;

“Place information” ~~which provides to~~ provide information related to ~~the~~ a place; and

“Hosted Services” ~~which uses the client-side to~~ use a browser functionalities to accomplish their tasks ~~to execute functions~~, including “Upload File” to let the user to upload a file from the client device, “URL to input” to let the user to input an URL, and “View on Browser” to let the user view ~~the~~ a file ~~on the client device~~.

52. (currently amended) The computer-based system of claim 12, wherein the ~~means for creating, removing, and managing services~~ graphical user interface for managing the computing source of functionality as an available service through the associated SSD includes any one or combination of the following:

means for making ~~SDS~~ the SSD available through one or more of the discovery mechanisms,

means for changing the SSD discovery mechanism to use,

means for holding the ~~SDS~~ SSD,

means for recovering the ~~SDS~~ SSD to one of the discovery mechanisms,

means for removing the ~~SDS~~ SSD from discovery mechanisms, and

means for changing ~~its~~ the SSD publishing parameters including expiration, invocation limit, and access control.

53. (currently amended) The computer-based system of claim 52, wherein the ~~means for creating, removing, and managing services~~ comprise graphical user interface comprises any one or a combination of:

a Pervasive Instance Provision Environment (“PIPE”) to provide ~~which provides~~ local or remote APIs to publish and optionally manage services, and optionally ~~provides~~ provide the user with user interfaces to publish and manage the services;

a “Semantic Instance Scrapers for Applications” ~~which publishes the~~ to publish available instances as they become available for the application and to optionally let ~~enable~~ the user to manage the service provisions based upon the publication;

an “Instance Selector with Instance Providing Service Creation” ~~which lets~~ to enable the user publish ~~the~~ an instance the user ~~selected~~ selects for the instance selector service and optionally lets the user manage the service provisions;

a publisher ("White hole") to which lets the user publish objects from a local computing device as semantic instances through its user interface and optionally lets the user manage the service provisions;

a "Public Directory" which lets the user to publish instances on a device and optionally lets the user manage the service provisions;

a "Bank" which lets the user to publish instances through its service invocation and optionally lets the user manage the service provisions;

an "Image/Audio/Video Service Control" which lets the user to publish instances created by or from the devices and optionally lets the user manage the service provisions;

a "Removable Media Publisher" which lets the user to publish instances on the removable media inserted into a computing device and optionally lets the user manage the service provisions; and

a "Fax" which publishes to publish the documents received and optionally lets the user manage the service provisions.

54. (currently amended) ~~A computer-based~~ computer implemented method comprising:

performing using a computer enabling a user to compose a task computing, thus enabling users to define tasks by combining available that comprises a plurality of different types of computing sources of functionality, each computing source of functionality being a service to the user, by: and to execute such tasks

associating each service with a semantic service description (SSD), which semantically describes the plurality of different types of computing sources of functionality for filtering, composing and executing the service, and is discoverable as an available service according to one or more discovery protocols, wherein the SSD comprises:

a semantic description of the service, including a semantic description of input/output parameters of the service as semantic input/output parameters, based upon an ontology,

a filter parameter specifying relevance of the service, and

a grounding including:

a service invocation interface to the service; and/or

an input/output parameter mapping and/or an input/output parameter transformation function between the semantic input/output parameters and syntactic input/output

interface parameters of the service;

dynamically discovering one or more of the SSDs as the available services through the plurality of discovery protocols to discover the SSDs;

interfacing with the user for real-time composing an executable task comprising combining two or more of the available services by dynamically presenting to the user feasible possible executable tasks based upon one or more of filtering the discovered available services according to a context of the user including the composed task, the filter parameters in the SSDs, and/or the semantic input/output parameters in the SSDs; and

executing a task by invoking the two or more available services that comprise the task, including enabling the user to interact with an invoked available service, based upon the grounding in the associated SSDs including the service invocation interfaces and the input/output mapping and/or transformation functions between the semantic input/output parameters and the syntactic input/output parameters.

55. (currently amended) The computer-based method of claim 54, wherein ~~available functionality originates~~ the computing sources of functionality originate in devices, computing applications, and electronic services available and/or previously defined tasks ~~through remote procedure calls including Web Services, UPnP, CORBA, RMI, RPC, DCE, DCOM or comprises previously defined tasks.~~

56. (currently amended) The computer-based method of claim ~~55~~54, wherein all ~~available functionality is abstracted to the user as a service and each service~~ the SSD is expressed in a service description language.

57. (currently amended) The computer-based method of claim ~~56~~54 wherein:
~~each service has at least one semantic description associated with it,~~
~~each semantic description can be~~ SSD is provided by any combination of the a creator or owner of the service, the owner of the service computing sources of functionality or some other third party, and
~~the service can be made~~ making available or unavailable the service by making available or unavailable discovery of one or more of its semantic descriptions SSDs associated with the service.

58. (cancelled)

59. (currently amended) The computer-based method of claim 54, further comprising saving the composed claim 58 wherein the specified tasks are saved, automatically, or as instructed by the user, as new available services.

60. (currently amended) The computer-based method of claim 59, ~~wherein further comprising making available the saved previously specified composed tasks saved as services are available to the user who created them, to all other users, or to any user-defined, or pre-defined group of users.~~

61. (currently amended) The computer-based method of ~~claim 60~~claim 54, wherein the ~~means for discovering services utilize a service discovery protocol, including one or more discovery protocols include~~ any one or any combination of the following:

UPnP discovery, UDDI, Local Service Repository, Jini, Bluetooth SDP, Rendezvous, and InfraRed (IR) discovery.

62. (currently amended) The computer-based method of claim ~~61~~54, wherein the ~~filtering discovered services of the discovered available services according to a context of the user include~~ any one or any combination of the following:

User profile, Task at hand, User device characteristics, User location, User motion status, User network connectivity, User specified keywords, features of a set of the available services when considered as a whole, or individual available service features.

63. (currently amended) The computer-based method of claim ~~62~~54, wherein the ~~specifying a task include~~real-time composing by the user of the executable task includes any one or any combination of the following:

a planning-based, automated system, or
an interactive user interface that supports any one or any combination of the following elements: visual, voice, text, Braille, ~~tactile~~tactile.

64. (currently amended) The computer-based method of claim ~~63~~54, wherein the ~~means for executing a specified task utilizes a service execution mechanism including any one~~

~~or any combination of the following:~~ SSD service invocation interface is according to one or more of a remote procedure call including Web Services calls, SOAP, UPnP actions, JINI, CORBA, RMI, RPC, DCE, DCOM, KQML, FIPA-ACL, or InfraRed (IR), or local function call, or local object call, or code described directly in the SSD~~Local function call, and Local object call.~~

65. (currently amended) The computer-based method of claim 64, ~~wherein the creating, removing, and~~ further comprising managing services include a computing source of functionality as an available service through the associated SSD by any one or any combination of the following: ~~Graphical~~ a graphical user interface controlling creation, provision, holding and/or removal of the associated SSD, executing or interacting with the computing source of functionality, or processing events from an operating system of a user-operated device, service execution, device interaction, events from the operating system of the user-operated device and applications executing on the user-operated device.

66. (currently amended) A computer-readable medium storing a program which when executed by a computer causes the computer to execute the functions comprising:

~~performing using a computer enabling a user to compose a task computing, thus enabling users to define tasks by combining available~~ that comprises a plurality of different types of computing sources of functionality, each computing source of functionality being a service to the user, by: and to execute such tasks

associating each service with a semantic service description (SSD), which semantically describes the plurality of different types of computing sources of functionality for filtering, composing and executing the service, and is discoverable as an available service according to one or more discovery protocols, wherein the SSD comprises:

a semantic description of the service, including a semantic description of input/output parameters of the service as semantic input/output parameters, based upon an ontology,

a filter parameter specifying relevance of the service, and

a grounding including:

a service invocation interface to the service; and/or

an input/output parameter mapping and/or an input/output parameter transformation function between the semantic input/output parameters and syntactic input/output interface parameters of the service;

dynamically discovering one or more of the SSDs as the available services through the plurality of discovery protocols to discover the SSDs;

interfacing with the user for real-time composing an executable task comprising combining two or more of the available services by dynamically presenting to the user feasible possible executable tasks based upon one or more of filtering the discovered available services according to a context of the user including the composed task, the filter parameters in the SSDs, and/or the semantic input/output parameters in the SSDs; and

executing a task by invoking the two or more available services that comprise the task, including enabling the user to interact with an invoked available service, based upon the grounding in the associated SSDs including the service invocation interfaces and the input/output mapping and/or transformation functions between the semantic input/output parameters and the syntactic input/output parameters.

67. (currently amended) The computer-readable medium of claim 66, wherein ~~available functionality originates~~the computing sources of functionality originate in devices, computing applications, ~~and~~ electronic services available and/or previously defined tasks ~~through remote procedure calls including Web Services, UPnP, CORBA, RMI, RPC, DCE, DCOM or comprises previously defined tasks.~~

68. (currently amended) The computer-readable medium of claim ~~67~~66, wherein ~~all available functionality is abstracted to the user as a service and each service~~the SSD is expressed in a service description language.

69. (original) The computer-readable medium of claim ~~68~~66, wherein:
~~each service has at least one semantic description associated with it,~~
~~each semantic description can be~~SSD is provided by any combination of the ~~a~~ creator or
owner of the service, the owner of the service~~computing sources of functionality~~ or some other third party, and

~~the service can be made~~making available or unavailable the service by making available or unavailable discovery of one or more of ~~its semantic descriptions~~SSDs associated with the service.

70. (cancelled)

71. (currently amended) The computer-readable medium of claim ~~70~~66, ~~wherein the specified~~further comprising saving the composed tasks ~~are saved~~, automatically, or as instructed by the user, as new available services.

72. (currently amended) The computer-readable medium of claim 71, ~~wherein further comprising making available the saved previously specified~~composed tasks ~~saved as services are available to the user who created them, to all other users, or to any user-defined, or pre-defined group of users.~~

73. (currently amended) The computer-readable medium of claim ~~72~~66, wherein the ~~discovering services utilize a service discovery protocol, including one or more discovery protocols include~~ any one or any combination of the following:

UPnP discovery, UDDI, Local Service Repository, Jini, Bluetooth SDP, Rendezvous, and InfraRed (IR) discovery.

74. (currently amended) The computer-readable medium of claim ~~73~~66, wherein the filtering ~~discovered services of the discovered available services according to a context of the user~~ include any one or any combination of the following:

User profile, Task at hand, User device characteristics, User location, User motion status, User network connectivity, User specified keywords, features of a set of the available services when considered as a whole, or individual available service features.

75. (currently amended) The computer-readable medium of claim ~~74~~66, wherein the ~~specifying a task include~~ real-time composing by the user of the executable task includes any one or any combination of the following:

a planning-based, automated system, or
an interactive user interface that supports any one or any combination of the following elements: visual, voice, text, Braille, ~~tactile~~tactile.

76. (currently amended) The computer-readable medium of claim ~~75~~54, wherein ~~the executing a specified task utilizes a service execution mechanism including any one or any combination of the following:~~ the SSD service invocation interface is according to one or more of

a remote procedure call including Web Services calls, SOAP, UPnP actions, JINI, CORBA, RMI, RPC, DCE, DCOM, KQML, FIPA-ACL, or InfraRed (IR), or local function call, or local object call, or code described directly in the SSD Local function call, and Local object call.

77. (currently amended) The computer-readable medium of claim ~~76~~66, ~~wherein the creating, removing, and further comprising managing services include~~ a computing source of functionality as an available service through the associated SSD by any one or any combination of the following: ~~Graphica~~ a graphical user interface controlling creation, provision, holding and/or removal of the associated SSD, executing or interacting with the computing source of functionality, or processing events from an operating system of a user-operated device, service execution, device interaction, events from the operating system of the user-operated device and applications executing on the user-operated device.